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(54) Vehicle with combined tilting and steering

(57) The three- or four- wheeled vehicle, which may be sail-powered, has a platform (1) which is tiltable about fore-and-aft axial bearings (3) by changing the load distribution or by hydraulic or mechanical means. The tilting movement of platform (1) is transmitted via pivot plate (3) and linkage (6, 7, 9) to the steerable wheels so that the inclination of the wheels against inertia and the steering of the wheels are controlled by the tilting of the platform.

FIG-1.

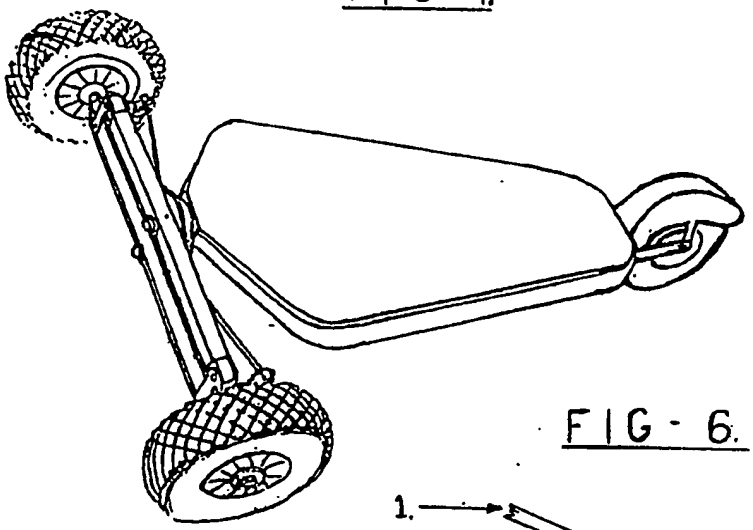

FIG-6.

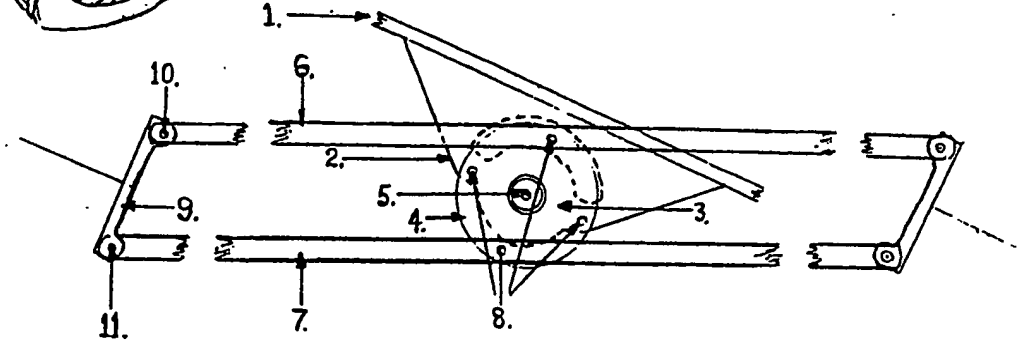

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FIG-1.

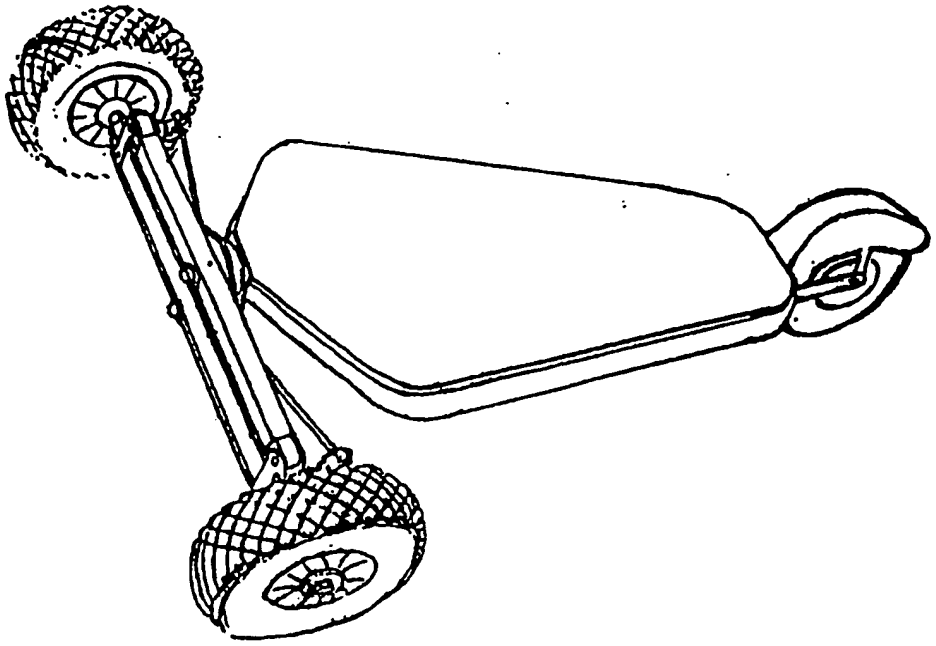


FIG-2.

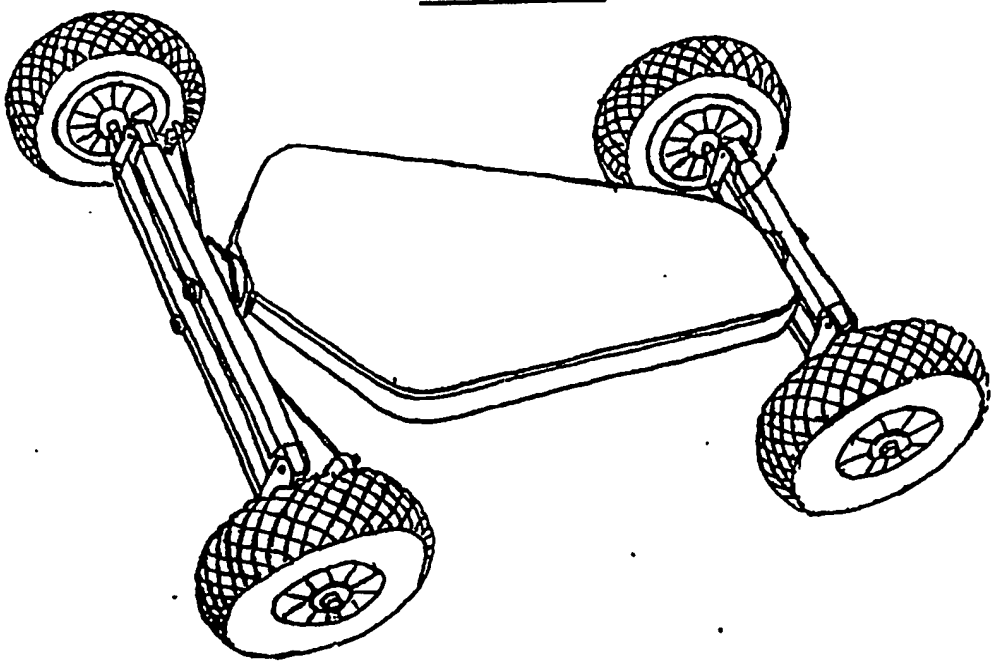


FIG-3.

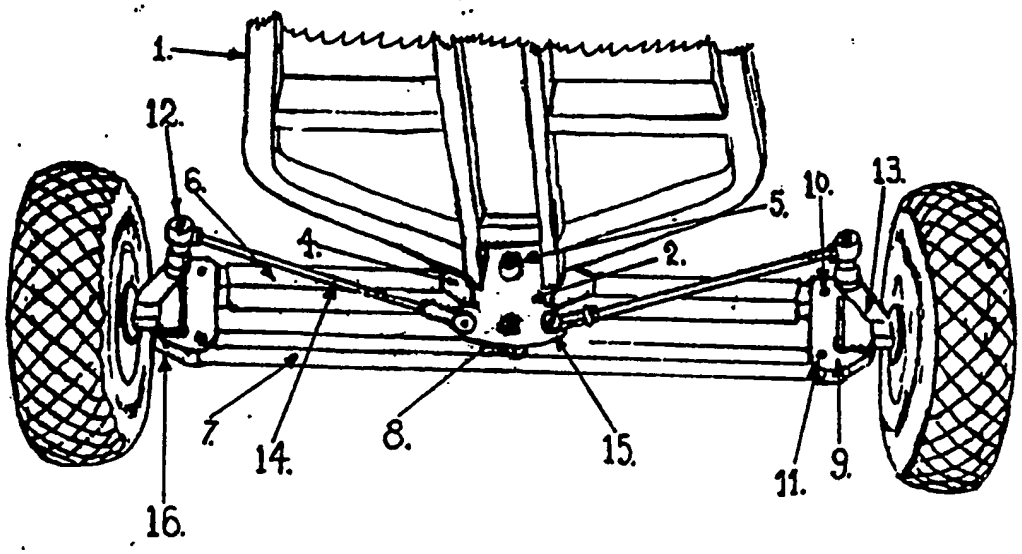


FIG-4.

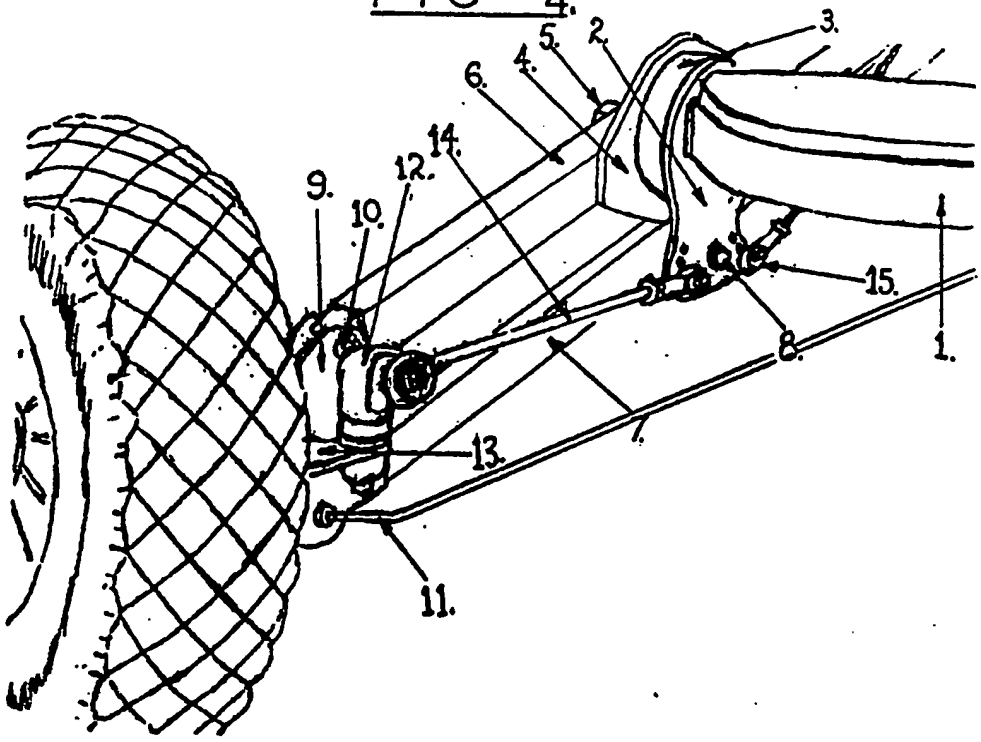


FIG - 5.

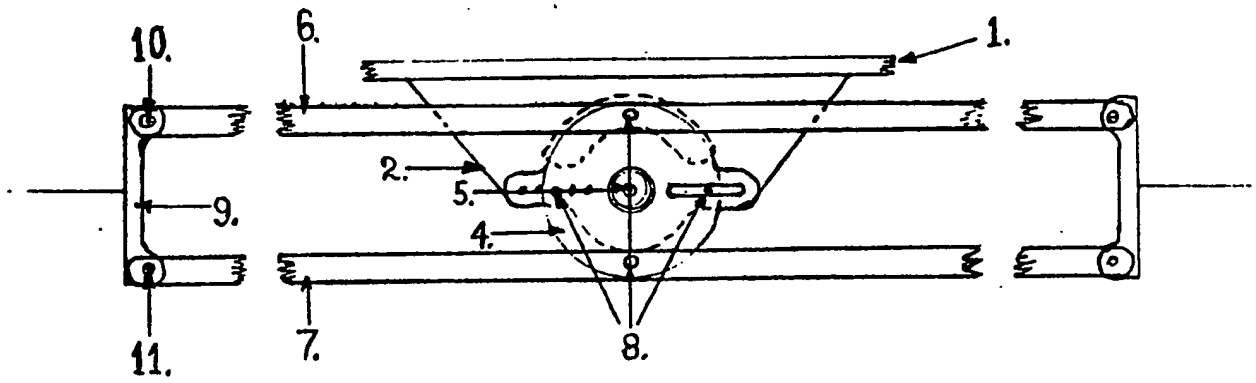
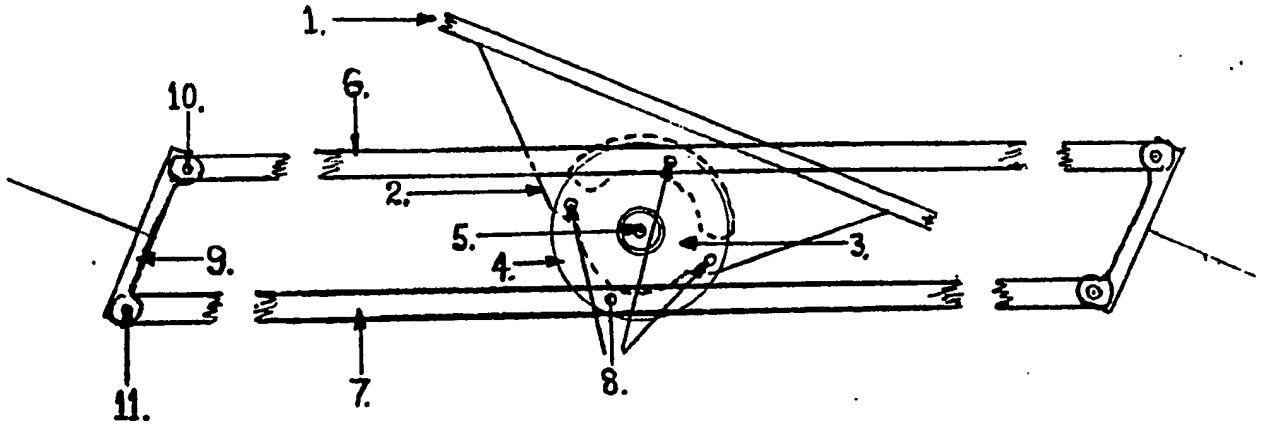


FIG - 6.



COMBINED VEHICULAR ANTI-INERTIA & STEERING DEVICE

This present invention relates to a combined vehicle anti-inertia and steering device.

All vehicles, with the exception of the fixed trajectory type, require a steering control mechanism to enable manoeuverability when in motion, of which there are many design's available. ie,(steering box and associate linkage, rack and pinion.) etc. As are the many methods employed to improve ground adhesion and stability whilst manoeuvering. ie, (anti-roll bars,independantly sprung and damped suspension, camber, tracking and load over wheel displacement.) etc.

Conventional steering control systems may allow the vehicle to manoeuvre at speed, but the inertia created in the mass so reaching the speed attained, is still along the plane of its trajectory at its moment of change in direction. This mass and its inertia are then the limitation of the ascribed arc of directable change allowable prior to ground adhesion being severed.

According to the present invention there is provided a vehicle of multi wheel support design, where the inclination of the wheels against inertia and the steering of the wheels to allow manoeuverability is controlled by the displacement of the chassis or platform along its axial length via the pivot bearings located on the axle beams at the leading and trailing extremes.

The vehicle may be propelled by any conventional motive power, but a specific embodiment of the presented invention appertaining to a sail powered land sports vehicle described by way of example with reference to the accompanying drawings.

IN WHICH.

Figures 1. & 2. Show in perspective, simple versions of a three and four wheeled application of the design mechanism.

Figure 3. Illustrates the underside view of the leading end of the chassis or platform showing a simple unbraked and unsprung construction of the requisite mechanism in a neutral plane.

Figure 4. Shows in part, a side elevation view of the same leading end mechanism, depicting a slight deviation of the chassis or platform about its pivot axis, resulting in wheel inclination and steering alignment via actuating linkages.

Figures 5. & 6. Show an alternative embodiment to the arrangement of the anti-inertia mechanism depicted in Figures 3. & 4. in which the axial movement of the chassis or platform about its central pivot axis imparts equal motion to both upper and lower transverse axle beams, thereby keeping the axial pivot point central to the wheel axle centres.

With reference to the illustration and drawing Figure 1. the three wheel version of the implementation is arranged with the single wheel trailing in order to utilise the proven

stability of this configuration the single trailing wheel to be mounted verticle and at right angles to the plane of the platform or chassis so as to incline at the same angle that the chassis or platform is pivoting about the axial bearing.

The four wheel version of the embodiment as depicted in Figure 2., must contain the anti-inertia mechanism at both leading and trailing extremes of the chassis or platform, but may also include the addition of a reversed design of the steering mechanism at the trailing end to facilitate four wheel steering should a smaller turning circle be desired.

The addition of suspension and or braking facilities must be fixed so as not to prejudice the function of the operating mechanism.

Refering to drawings Figures 3. & 4., it will be noted that the main transverse axle beam 6 and lower actuating beam 7 terminate each end with pivotable connections 10 & 11 to beam clevis brackets 9. These in turn carry via king pins 16 the steering arm trunnion and stub axle 20. assembly.

The rotation of axial pivot plate 2 affixed to chassis or platform 1 about axial bearing 3 displaces the lower beam 7 via actuating stud 8 in a parallel motion to the main transverse axle beam 6 so inclining the beam clevis 25. assemblies 9 to a positive and negative rake by the same

degree of movement and subsequently imparts this movement to the wheels via stub axle 13.

Figure 5. depicts an alternative arrangement in the design of axial pivot plate 2 and damper friction plate 4. in which a series of holes or slots may be machined in the pivot and friction plates to enable the position of the horizontal actuating studs to be moved both in and out of the common radius pitch of the verticle actuating studs as shown in Figure 6 in order to increase or decrease the equal chassis or platform tilt to the inclination of the wheels .

The positioning of the horizontal actuating studs in this alternative design arrangement may be by way of automatic adjustment controlled by the speed of the vehicle in order that a variance in wheel inclination compensates for the differing anti-inertia control required in slow to high speed turning.

The steering of the wheels is achieved by the rotation of the steering arm trunion and stub axle assemblies 13 about the king pins 16 located in the clevis brackets 9. This rotation being activated by the movement of axial pivot plate 2 and transmitted through linkage rods 14 and pivots 12 & 15.

Refering to Figures 5 & 6 it will be noted that the position of the axial pivot point of the chassis or platform 1 is centrally between the upper and lower transverse axle beams 6 & 7. The rotation of the axial pivot plate 2 about

it's centre bearing by the displacement of the chassis or platform 1 is thereby transfered via the two horizontal actuating studs 8 to the damper friction plate 4. This damper friction plate movement is then transfered via the verticaly aligned studs 8 to give equal and opposing movement to the upper and lower transverse axle beams 6 & 7. This in turn reduces the sideways movement of the chassis or platform and retains a constant axial elevation point.

The chassis or platform may be suspended at the axial pivot point or if additional ground clearance is required, be elevated as shown in Figures 5 & 6.

Figure 6 shows the position of the 4 horizontal and vertical actuating studs 8 on an equal pitch circle diameter, whilst Figure 5 shows the alternative arrangement for varying the horizontal actuating stud position.

Axle beam rigidity may be achieved by the inclusion as depicted in Figures 3 & 4 of torsion bars to the lower clevis pins 11. These to terminate in pivotable connections to a suspended pillar on the centre underside of the chassis or platform. The length of the suspended pillar to be determined by the distance between the axial pivot point and lower beam actuating stud 8.

On the alternative arrangement depicted in figures 5 & 6, the four wheeled version of this design may gain axle beam rigidity by the inclusion of a fixed connection between

both pairs of leading and trailing beam clevis brackets 9, or from either or both of the leading and trailing transverse axle beams 6 & 7 as this would then form a rigid rectangular structure. This arrangement being permissable due to the leading and trailing anti-inertia mechanisms moving or inclining about the same plane.

Whilst all the drawings depict the mechanism being actuated by the load distibution on the chassis or platform being moved to either side of its equilibrium, the tilt of the chassis or platform may be controlled by hydraulic or mechanical means via conventional steering mediums.

The present invention therefore provides. A mechanism for wheel steering alignment that is controlled by or in conjunction with the deviation of the chassis or platform about the centre of its axial support. A mechanism for the inclination of the wheels that is controlled by or in conjunction with the deviation of the chassis or platform about the centre of its axial support. A mechanism resulting in the combination of both features, giving a new dimension of vehicular motion in that the wheels may be substituted by a variety of support mediums ie. Ski's, Skates, Boat hulls etc., as the inclination mechanism provides the attack angle necessary for the manoeuvering of these mediums, giving a combined reduction in the vehicles tendancy to drift or break away.

Axle beam rigidity may be achieved by the inclusion as depicted in Figures 3 & 4 of torsion bars to lower clevis pins 11. These to terminate in pivotable connections to a suspended pillar on the centre underside of the chassis or platform. The length of the suspended pillar to be determined by the displacement distance petween axial pivot stud 2 and lower beam actuating stud 8.

Whilst the drawings and illustrations depict the mechanism being actuated by the load distribution on the chassis or platform being moved to either side of its equilibrium, the tilt of the chassis or platform may be controlled by hydraulic or mechanical means via conventional steering mediums. These may in turn be governed by the speed of the vehicle to the amount of allowable chassis or platform tilt in order to compensate for slow speed changes in direction.

M.Inst.P.I.

ILLUSTRATION INDEX.

I Chassis or Platform.

2 Axial Pivot Plate.

3 Axial Bearing and Damper Pad.

4 Damper Friction Plate.

5 Axial Pivot Stud.

6 Main Transverse Axle Beam.

7 Lower Actuating Beam.

8 Actuating Beam Stud.

9 Beam Clevis Brackets.

10 Main Beam Clevis Pens.

11 Actuating Beam Clevis Pins/Torsion Bar.

12 Steering Arm Pivot Connectors.

13 Steering Arm Trunnion and Stub Axle Assembly.

14 Steering Linkage Rods.

15 Steering Rod Drive Pivots.

16 King Pins.

CLAIMS.

1. A vehicle in which the chassis or platform deviates about its axial suspension to counteract the centrifuge effect on its loading when steered in motion.

2. A vehicle comprising a chassis or platform in which the vehicle is steered by a mechanism to tilt the chassis or platform or by deviation of the load imposed on the chassis or platform about its axial support.

3. A vehicle comprising a chassis or platform in which the inclination of the wheels against the inertia of the moving vehicle when changing it's steered direction, is controlled by a mechanism or deviation of the load imposed on the chassis or platform about its axial support.

4. A combined mechanism for the steering of a vehicle as claimed in claim 2. and for the inclination of the wheels as claimed in claim 3.

5. A vehicle as claimed in claim 2. in which the vehicle comprises steerable wheels from which a mechanical linkage is provided between the chassis or platform, such that on tilting of the chassis or platform, the wheels turn to effect steering of the vehicle.

6. A vehicle as claimed in claim 3. in which the vehicle comprises inclinable wheels from which a mechanical linkage is provided between the chassis or platform, such that on tilting of the chassis or platform, the wheels incline from

the neutral vertical position.

7. A vehicle as claimed in claims 2. & 5. in which the mechanical linkage comprises, levers connected to the respective wheel steering trunion and stub axle assemblies that are in turn connected by relevant linkage rods to a plate attached to the chassis or platform, the plate providing the leverage to move the levers and thereby steer the vehicles wheels.

8. A vehicle as claimed in claims 3. & 6. in which the mechanical linkage is through the wheels/stub axle/steering trunion assemblies, as fixed in the beam clevis brackets, that are in turn motivated through the movement generated in the upper and lower transverse axle beams by the plate or mechanism attached to the chassis or platform to provide the leverage.

9. A vehicle substantially as described with reference to the accompanying drawings.

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